

REMARKS

Initially, Applicants would like to thank Examiner Uhler for granting an interview and for his time spent in the interview.

Claims 1-3, 5-15 and 25-41 were previously pending in the application. Claim 6 is canceled and new claims 42-50 are added. Therefore, claims 1-3, 5, 7-15 and 25-50 are presented for consideration.

Claims 1-3, 5, 11-13, 15, and 35-38 are rejected as anticipated by TAKAHASHI et al. JP11-186033.

Reconsideration and withdrawal of the rejection are respectfully requested because the reference does not disclose or suggest that an iron carbide film has a body-centered tetragonal structure and a c-axis constitutes an axis of hard magnetization and a c-plane constitutes a plane of easy magnetization, wherein the axis of hard magnetization constitutes a direction which is perpendicular to the film surface and the plane of easy magnetization constitutes a direction, which is horizontal to the film surface as recited in claim 1 of the present application.

As set forth in the interview and as noted in the Official Action, TAKAHASHI et al. do not teach the specific direction of magnetization as recited in claim 6. Since claim 1 is amended to include the subject matter of claim 6, it is believed that the anticipation rejection by TAKAHASHI et al. is rendered moot.

However, as noted in the Advisory Action of April 1, 2004, the evidentiary reference (EXPERIMENTAL REPORT Magnetic Structure of $\text{Ho}_2\text{Co}_{15}\text{Si}_2$) and Applicants' arguments with respect thereto are not considered sufficient to teach that TAKAHASHI et al. will necessarily have a perpendicular easy axis. Accordingly, Applicants submit herewith a Declaration under Rule 132 in support of Applicants' assertion that TAKAHASHI et al. will necessarily have a perpendicular easy axis. Such declaration is believed to remove TAKAHASHI et al. as a reference.

Claims 1-3, 5, 7-8, 15, 25-29 and 34-38 are rejected as unpatentable over KOBAYASHI et al. 4,858,049 in view of TAKAHASHI et al. This rejection is respectfully traversed.

As noted in the interview, KOBAYASHI et al. was cited for a similar structure as that of TAKAHASHI et al. and KOBAYASHI et al. in view of TAKAHASHI et al. was not applied against claim 6. Since claim 1 is amended to include the subject matter of claim 6, the 35 USC §103 rejection over KOBAYASHI et al. in view of TAKAHASHI et al. is also believed moot.

Claims 6 and 39-41 are rejected as unpatentable over KOBAYASHI et al. in view of TAKAHASHI et al. and further in view of CAREY et al. 6,542,341. This rejection is respectfully traversed.

As set forth at the interview, the process of forming the film of the present invention and the process of forming the films in KOBAYASHI et al. and TAKAHASHI et al. are different and

thus the resultant structure is different. Specifically, as noted in the amendment of May 5, 2003, the process of forming the film of KOBAYASHI et al. and TAKAHASHI et al. will result in an easy axis perpendicular to the film surface.

This is evidenced in paragraphs [0001] and [0003] of TAKAHASHI et al. discussing a vertical magnetic recording material. A recording medium that has an easy axis perpendicular to the film surface as taught by TAKAHASHI et al. is formed as disclosed on paragraph [0014] of TAKAHASHI et al. using substrate temperatures of 120°C or more. As noted in the Official Action, KOBAYASHI et al. teach a similar manufacturing process. Specifically, Example 1 on column 3, lines 23-45 of KOBAYASHI et al. teach an Fe-C magnetic film formed with a substrate temperature of 250°C.

As set forth at the interview, it is known (see the Experimental Report submitted herewith for explanatory purposes only) that between 837 K and approximately 320 K, the easy magnetization direction is the c-axis, that is, the moments are aligned along the c-axis (perpendicular to the film surface) as taught by both TAKAHASHI et al. and KOBAYASHI et al.

At a temperature near 320 K, a spin-reorientation transition takes place, leading to an easy magnetization direction perpendicular to the c-axis, such that the hard axis is perpendicular to the film surface as recited in claim 1 of the present application. Specifically, the temperature of the

substrate of the present invention is approximately 320 K or below such that the axis of hard magnetization constitutes a direction which is perpendicular to the film surface.

As pointed out at the interview, page 73, lines 9-22 of the present application disclose that when the substrate temperature is within a range from 125°C to 200°C (as taught by KOBAYASHI et al. and TAKAHASHI et al.) the intensity of the diffraction line decreases rapidly as the temperature rises and therefore the iron carbide film which is formed is considered to depart from the desired crystal structure. When the substrate temperature is within a range from 10°C to 70°C, the desired α' -Fe-C film can be made which is preferred.

Accordingly, the evidentiary reference supports Applicants' assertion that materials that have the same composition (FeC) can have different magnetic properties such that both TAKAHASHI et al. and KOBAYASHI et al. will always have an easy axis of magnetization perpendicular to the plane of the film based on the temperature that the film is formed and would not have an axis of hard magnetization constituting a direction which is perpendicular to the film surface as recited in claim 1 of the present application.

In addition, Applicants declaration submitted herewith provides additional support for Applicants' assertion that TAKAHASHI et al. will necessarily have an easy axis of magnetization perpendicular to the plane of the film based on the

perpendicular magnetic anisotropy value. KOBAYASHI et al. is silent as to the perpendicular magnetic anisotropy value.

As noted at the interview, combining TAKAHASHI et al. and KOBAYASHI et al. with a reference that teaches changing the direction of easy magnetization to suit the type of media to be recorded would change the principle of operation of TAKAHASHI et al. and KOBAYASHI et al.

MPEP §2143.01 states that if a proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

CAREY et al. is cited for the teaching that KOBAYASHI et al. or TAKAHASHI et al. could be modified to render obvious an axis of hard magnetization constitutes a direction which is perpendicular to the film surface as recited in claim 1. As set forth above, and as discussed at the interview, such modification would change the principle of operation of TAKAHASHI et al. and KOBAYASHI et al. and thus is not sufficient to render the claims *prima facie* obvious.

In addition, as set forth at the interview, CAREY et al. do not appear to teach that for which it is offered. Specifically, CAREY et al. teach that recording and reproducing heads have their magnetization oriented in the same direction as

that of the medium they are used with. However, CAREY et al. do not teach or suggest an iron-carbide film has a body-centered tetragonal structure wherein an α' phase is a martensite phase. CAREY et al. teach that recording can be done both perpendicular to the film surface and parallel to the film surface. Teachings of CAREY et al. are insufficient to suggest to one of ordinary skill in the art that an iron-carbide film having a body-centered tetragonal structure in α' phase as a martensite phase has an axis of hard magnetization constituting a direction which is perpendicular to the film surface as recited in claim 1 of the present application.

In addition, as set forth above, even if CAREY et al. were to teach that for which it is offered, the proposed combination of references would change the principle of operation of TAKAHASHI et al. and KOBAYASHI et al. such that the proposed combination of references is not sufficient to render the claims *prima facie* obvious. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Claims 9, 11-12 and 14 are rejected as unpatentable over KOBAYASHI et al. in view of TAKAHASHI et al. and further in view of HORI et al. 5,006,395. This rejection is respectfully traversed.

HORI et al. is only cited for the teaching that an Fe-C film may contain CO. HORI et al. do not teach or suggest what is recited in claim 1. As set forth above, KOBAYASHI et al. in view

of TAKAHASHI et al. do not disclose or suggest what is recited in claim 1. Since claims 9, 11-12 and 14 depend from claim 1 and further define the invention, the proposed combination of references would not render obvious claims 9, 11-12 and 14.

Claim 10 is rejected as unpatentable over KOBAYASHI et al. in view of TAKAHASHI et al. and further in view of HORI et al. 5,068,147. This rejection is respectfully traversed.

HORI et al. is only cited for the teaching of adding nitrogen to an Fe-C film. HORI et al. do not disclose or suggest what is recited in claim 1. As set forth above, KOBAYASHI et al. in view of TAKAHASHI et al. do not teach or suggest what is recited in claim 1. Since claim 10 depends from claim 1 and further defines the invention, the proposed combination of references would not render obvious claim 1.

Claims 1 and 30-31 are rejected as unpatentable over REED WO 93/12928 in view of TANAKA et al. 5,854,727 and further in view of KOBAYASHI et al., TAKAHASHI et al. and The Wiley Encyclopedia of Electrical and Electronics Engineering. This rejection is respectfully traversed.

Since these references were not applied against claim 6 and since claim 1 is amended to include the subject matter of claim 6, this rejection is believed moot.

Claims 1 and 32-33 are rejected as unpatentable over TANAKA et al. in view of KOBAYASHI et al. and TAKAHASHI et al.

and The Wiley Encyclopedia of Electrical and Electronics Engineering. This rejection is respectfully traversed.

Since claim 1 is amended to include the subject matter of claim 6 and since the above rejection is not applied against claim 6, the above rejection is believed moot.

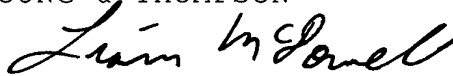
New claims 42-50 are directed to a negative magnetocrystalline anisotropy value. As set forth above and as supported in the declaration submitted herewith TAKAHASHI et al. teach a positive value. Accordingly, new claims 42-50 are also believed patentable over the cited prior art.

In view of the present amendment, the foregoing remarks and the Declaration under Rule 132, the application is believed in condition for allowance. Reconsideration and allowance are respectfully requested.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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APPENDIX:

Declaration of Migaku TAKAHASHI